CLAIMS

1. Film compositions that comprise, as a conductive phase, pyrochlore-related compounds of the general formula M_{2-x} Cu_x Ru_2 $O_{6+\delta}$, wherein M is a rare earth metal selected from the rare earth metals of atomic number 60-71 inclusive.

2. Compositions according to claim 1, wherein X = 0.2 - 0.4 and δ = 0-1.

3. Compositions according to claim 1, comprising a dielectric phase.

4. Compositions according to claim 3, wherein the dielectric phase consists of or comprises, as a main component, a glass phase.

5. Compositions according to claim 4, wherein the glass phase comprises by mole% 40-60% SiO_2, 1-20% B_2O_3, 1-15% BaO, 1-6% SrO, 1-15% CaO, 0.5-3% CuO, 0.5-20% ZnO, 0.25-7% M_2O_3, 0.25-4% M'_2O , wherein M' is Li, Na, K or mixture thereof, and M is a rare earth element of atomic number 57 to 71 inclusive, or mixture thereof; and 0-3% of a metal fluoride in which the metal is selected from the group consisting of alkali and alkaline earth metals.

6. Compositions according to claim 4, wherein the glass phase comprises by mole% 40 to 65% SiO_2, 10 to 20% Bi_2O_3, 0.1 to 3% Al_2O_3, and glass modifiers in total amount of 15 to 25%, wherein said glass modifiers comprise 1 to 23% ZnO, 0.1 to 5% CuO, 0.1 to 5% CaO and 0.1 to 2% MgO.

7. Compositions according to claim 4, wherein the glass phase comprises a blend of two glasses.

8. Compositions according to claim 7, wherein

a) a first glass comprises by mole% 40-65% SiO_2, 1-15% B_2O_3, 12-27% BaO, 5-10% SrO, 5-15% CaO, 0-5% MgO, 0-5% Al_2O_3, 0-

12% alkali metal oxides and 0-3% of a metal fluoride in which the metal is selected from the group consisting of alkali and alkaline earth metals; and

b) a second glass comprises by mole% glass forming compounds in a total amount of 75 to 85% wherein, said glass forming compounds comprise 40 to 65% SiO_2, 10 to 20% Bi_2O_3, 0.1 to 3% Al_2O_3, and glass modifiers in total amount of 15 to 25%, wherein said glass modifiers comprise 1 to 23% ZnO, 0.1 to 5% CuO, 0.1 to 5% CaO and 0.1 to 2% MgO.

9. Compositions according to claim 3 or 4, wherein the dielectric phase is selected from Al_2O_3, SiO_2, $ZrSiO_4$, ZrO_2, aluminosilicates and mixtures thereof.

10. Compositions according to claim 1, further comprising an organic vehicle.

11. Compositions according to claim 10, wherein the organic vehicle is a solution of resin in a solvent or mixture of solvents.

12. Compositions according to claim 1, further comprising a filler.

13. Compositions according to claim 12, wherein the filler is chosen from the group consisting of Al_2O_3, SiO_2, $ZrSiO_4$, ZrO_2 and aluminosilicates.

14. Compositions according to claim 1, comprising

a) a dispersion of finely divided particles of the pyrochlore - related compound corresponding to the formula $M_{2-x}\,Cu_x\,Ru_2\,O_{6+\delta}$, wherein M is a rare earth metal selected from the rare earth metals of atomic number 60-71 inclusive, $X = 0.2 - 0.4$, $\delta = 0-1$;

b) glasses according to claims 5, 6, 7, 8, and mixtures thereof; and

c) dielectrics selected from the group consisting of SiO_2, $ZrSiO_4$ and Al_2O_3.

15. Compositions according to claim 14, wherein the rare earth metal is Neodymium.

16. A composition according claim 4, wherein the glass phase comprises glasses chosen from the group consisting of Cd-free and Pb-free bismuthate glasses, alkaline earth borosilicate glasses, and mixture thereof.

17. A composition according to claim 4, wherein the glass phase is chosen from the group consisting of lead-containing silicate glasses, lead-containing borosilicate glasses and mixtures thereof.

18. Method of preparing pyrochlore-related compounds as defined in claim 1, which comprises firing an admixture of finely divided particles of CuO, RuO_2 and a metal oxide selected from the rare earth metal oxides of atomic number 60 -71 inclusive, at a temperature of at least 800°C, in a non-reducing atmosphere.

19. Method according to claim 18, for preparing compounds having the formula $Nd_{2-x}\,Cu_x\,Ru_2\,O_{6+\delta}$, which comprises firing in air an admixture of finely divided particles of Nd_2O_3, CuO and RuO_2 at a temperature of 1000-1200°C.

20. Method of making film compositions according to claim 1, comprising preparing a powdered mixture of

a) 5-90% by weight of an oxide of the formula $Cu_x\,M_{2-x}\,Ru_2\,O_{6+\delta}$, wherein M is a rare earth metal selected from the rare earth metals of atomic number 60-71 inclusive, x is a number in the range of 0.25 to 0.4, and δ is a number in the range of 0 to 1; and

b) 95-10% by weight of dielectric materials.

21. Method according to claim 20, further comprising dispersing the powdered mixture in a liquid organic vehicle.

22. Method according to claim 20, wherein the oxide is chosen from the group consisting of $Nd_{1.70}$ $Cu_{0.30}$ Ru_2 $O_{6+\delta}$, $Nd_{1.75}$ $Cu_{0.25}$ Ru_2 $O_{6+\delta}$, and their mixtures wherein δ is a number in the range of 1 to 0.

23. Method according to claim 22, wherein the dielectric materials are chosen from the group consisting of glasses, oxides selected from $ZrSiO_4$, Al_2O_3, SiO_2, and mixture thereof.

24. Film compositions, substantially as described and illustrated.

25. Method of preparing pyrochlore-related compounds as defined in claim 1, substantially as described and illustrated.

26. Method of making film compositions according to claim 1, substantially as described and illustrated.